

FREQUENCY TUNABLE RESONANT SCANNER WITH AUXILIARY ARMS

ABSTRACT OF THE INVENTION

A MEMs scanning device has a variable resonant frequency. In one embodiment, the MEMs device includes a flexible arm that extends from an oscillatory body. An electrical field applies a force to the flexible arm, thereby bending the flexible arm to change the moment of inertia of the oscillatory body and a secondary mass carried by the flexible arm. The shifted combined center of mass changes the resonant frequency of the MEMs device. In another embodiment, an absorptive material forms a portion of a torsional arm that supports the oscillatory body. The mechanical properties of the absorptive material can be varied by varying the concentration of a gas surrounding the absorptive material. The varied mechanical properties change the resonant frequency of the scanning device. A display apparatus includes the scanning device and the scanning device scans about two or more axes, typically in a raster pattern. Various approaches to controlling the frequency responses of the scanning device are described, including active control of MEMs scanners and passive frequency tuning.